II. Plan Components

A. Curriculum

1. Consider curriculum needs in technology planning.

Technology planning should be guided by a collaborative vision of how technology can help students meet the academic content standards and reach the desired learning outcomes identified by a school district and its community in the comprehensive improvement plan. Team members should first review the curriculum goals and current student achievement data and then determine how technology may be effectively used to help students reach curriculum goals. Before teachers can use technology to address content standards, students may need to be provided a means of acquiring and refining technology and information literacy skills. (See Appendix B to learn more about information literacy.)

> *A copy of the state academic content standards for English–language arts, mathematics, science, and history–social science may be downloaded from the California Department of Education Web site <www.cde.ca.gov/board>. Standards for the visual and performing arts adopted by the State Board of Education in January 2001 may be viewed at the Department Web site <www.cde.ca.gov/shsd/arts>.*

2. Use technology to reduce time spent on administrative tasks and allow more time for instruction.

This component should also address the administrative uses of technology. Using technology to complete recordkeeping tasks more efficiently allows more time to be spent on instruction that improves student achievement. The plan may address other ways in which technology can assist site and district administrators in making decisions based on data.

A fifth-grade teacher has a new student in her class today. Thanks to technology and her district's support for administrative uses of technology, the school receives the student's electronic record on the same day he arrives in the class. The teacher is able to see clearly the new student's progress toward meeting the content standards. She is able to provide instruction tailored to the student's needs from the first day. Before the implementation of the electronic recordkeeping system, she often waited weeks, if not months, for records of new students to arrive.

3. Invest time in learning about the possibilities.

It is critical to educate the planning team on what is possible in a technology-rich learning environment. To accomplish this objective the planning team is encouraged to consider the types of technology that are appropriate and useful for the present and the future. Therefore, it is highly recommended that before writing the Curriculum component, the planning team communicate with its CTAP representative; search the Internet; and visit other schools, nonprofit organizations, and even businesses to obtain ideas about how technology can be used to support standards-based learning and the methods or tools used by teachers, library media teachers, and administrators to create effective learning environments with technology. Visit the California Department of Education Web site *<www.cde.ca.gov/edtech>* for resources on the integration of technology into the curriculum.

Many of the sixth graders at our school are struggling with Algebra and Functions standard 1.0 in the math content standards. We need a new way to get these concepts across to them, but where can we turn?

Visit the CLRN Web site <www.clrn.org>. The California Learning Resources Network (CLRN), supported by the California Department of Education, reviews electronic learning resources for alignment with California's content standards and the effective use of technology. This site also provides lesson plans tied to content standards. Just search on a standard, a subject, and/or a grade level to get a list of educator-rated electronic learning resources and lesson plans that can help you present material in new and engaging ways.

15

4. Include benchmarks and timelines in the plan to describe how and when chosen strategies will be implemented.

For assistance in generating the Curriculum component, see Section III, "Suggested Action Steps and Guiding Questions." The suggested action steps identify the tasks that, if completed, will ensure a thorough and complete plan for integrating technology into the curriculum. The "Timeline of Suggested Action Steps" in Section IV will be helpful to the planning team in assigning responsibilities and setting deadlines to complete the tasks. Guiding questions help identify the issues to be considered under each suggested action step.

Benchmarks and timelines need to be assigned to the proposed strategies. It is especially important to have a clear timeline and benchmarks for the Curriculum component because so many other parts of the plan flow from the decisions made in this part of the plan. A sample management chart and sample implementation timeline are included in Section IV, "Technology Planning Toolkit."

> Teachers can use technology to tailor instruction to individual student needs. At Upland High School in Upland, California (a Year 1 Digital High School), one biology teacher has his Advanced Placement students help manage their own learning. Using a strategy called Review Topic Presentations, his students choose a particular science topic to teach to the class. The topic conforms to the College Board exam expectations. These student-directed lessons include a three- to five-minute PowerPoint presentation, live Internet resources, visual aids, and a list of resources for further investigation. The lesson ends with a class discussion and evaluation.

B. Professional Development

1. Professional development is essential to the effective use of technology.

Classroom teachers, library media teachers, administrators, and technical support staff should receive technology training and use it to promote improved student achievement. Businesses consider such training a part of the total cost of ownership; without the training, the equipment is as useless as it would be without electricity. A rule of thumb in the business community is that the amount of resources committed to staff development should be approximately the same as the amount of resources committed to the acquisition of new equipment. School districts should consider adopting this rule as well.

> CTAP[2] is an online, self-assessment tool that allows educators to determine their level of technology proficiency: introductory, intermediate, or proficient. The self-assessment is based on rubrics aligned with the California Commission on Teacher Credentialing (CTC) "Factors to Consider," the technology standards for a California K–12 teaching credential. The results of the assessment enable educators to view and select the professional development opportunities that will advance their proficiency level. Visit CTAP[2] at its Web site *<http://ctap2.iassessment.org/>.*

2. **Technology training is best integrated into subject matter programs and embedded in the classroom or educational setting.**

   The plan needs to address how professional development will be delivered and allocate time for this important activity. Appendix C, "The Design Elements for High-Quality Professional Development," provides information on the most effective type of professional development. Because of the reduced number of staff development days, it may be difficult to find time for professional development dedicated solely to education technology. This difficulty may be overcome and professional development enhanced by incorporating technology into existing content-specific professional development.

   The best staff development is that which occurs closest to the individual. Teachers learn best by studying, doing, and reflecting; by collaborating with other teachers; by looking closely at student learning and evidence of achievement; and by sharing what they see. Therefore, staff development is best facilitated by being embedded in the workplace. As a part of the plan, time may be provided for collaboration during the workday, and on-site teacher or student "Technology Ambassadors" may be provided to assist teachers and administrators on specific technology projects.

> *Where can district and site administrators learn about technology planning, integrating technology into the curriculum, data-driven decision making, and other technology topics?*
>
> *Try TICAL, the Technology Information Center for Administrative Leadership supported by the California Department of Education. Visit the TICAL Web site <www.portical.org>, a one-stop, online technology information center with resources and solutions to assist administrators in effective leadership of "digital schools."*

3. Timing is important for effective professional development.

On-demand training appears to work especially well for technology in the educational setting. Personnel already in place, such as the library media teacher, technology coordinators, or technology teachers on special assignment, can deliver this technology training when the teacher and site administrator need it.

The timing of equipment purchases is also important to effective professional development. If the equipment is purchased long before the teachers and administrators have learned to use it, "new" equipment may become obsolete before it is ever used in a classroom. The Professional Development component needs to align with the timeline for equipment acquisition in the Infrastructure, Hardware, Technical Support, and Software component as well as support the goals and the timeline for implementing the technology strategies and methodologies under the Curriculum component.

4. Benchmarks and timelines in the plan describe how and when chosen strategies will be implemented.

For assistance in generating the Professional Development component, see Section III, "Suggested Action Steps and Guiding Questions." The steps identify the tasks to be accomplished for providing the identified professional development. The "Timeline of Suggested Action Steps" in Section IV may be used to assist the planning team in assigning responsibilities and setting deadlines to complete the tasks. Guiding questions help identify the issues to be considered under each suggested action step.

To implement the plan, the planning team needs to assign benchmarks and timelines to the proposed strategies. The Professional Development component benchmarks and timelines must provide for the necessary professional development in a time frame agreeable with the Curriculum component benchmarks and timeline. At the same time the benchmarks and timelines of the Professional Development component must be consistent with the constraints undoubtedly created by the Infrastructure, Hardware, Technical Support, and Software component timeline.

A sample management chart and a sample implementation timeline are provided in Section IV, "Technology Planning Toolkit."

C. Infrastructure, Hardware, Technical Support, and Software

1. **Generate a list of the technology the school district needs in order to support the Curriculum and Professional Development components.**

   Once the vision, goals, and strategies have been established for using technology to help students meet content standards, the next job is to identify the technology and physical plant modifications needed to accomplish the Curriculum and Professional Development components. Therefore, this component involves assessing the current status of the infrastructure (including the electrical capacity of the building[s]), hardware, software (including online learning resources), and technical support in the school district and planning how those resources can be recycled or supplemented to create the learning environment envisioned in the Curriculum component.

2. **Make the technology available and accessible.**

   The planning team must not only determine how the school district will use technology but also decide where technology will be used. Research on academic gains attributable to technology points to easy access for students and teachers in the classroom as the place in which the greatest impact may be achieved. Technology in the classroom is therefore preferable to technology located only in labs. But will each school also have labs to provide access to technology for students and the community after school as well as for whole-class use? Are labs all the district can afford for the first few years as it begins its acquisition of technology? These and other questions must be answered to make decisions about network capabilities and the amount of hardware purchased for both the short and the long term.

Another location issue is after-school access to technology and the school network. Will teachers, parents, and students be able to gain access to school equipment to complete their work in on-site, after-school programs or in community technology centers? Will they be able to use the school network from home or other nonschool locations?

> *Do you need assistance in the area of technical support? Are you trying to determine what skills your tech support staff need or how to find training for staff members? Or do you have a technical question and need help?*
>
> *If so, visit TechSETS (Technical Support for Education Technology in Schools), a statewide education technology service <www.techsets.org>. TechSETS is designed to support the escalating need for skilled technology support profession- als in schools. This service provides a user-friendly matrix of the technology skills needed by support professionals at different levels, online links to professional development opportunities for tech support staff who need to develop these skills, and an online interactive help desk.*

3. **Seek expert advice on the best technology to serve the school district for the lowest cost.**

   Obtaining expert advice can ensure the selection of technology that will best serve the needs of the school district and continue to support the curriculum and academic content standards. For example, if the Curriculum component identifies a need for student access to the Internet for research and word-processing capabilities, all that is technically required are stand-alone com- puters with modems and telephone lines. However, speed of Internet access, student access to the hardware, storage space (whether each student stores his or her work on a personal disk or on the server), security, and technical support for individual machines are issues that need to be considered. An expert can help the district explore these issues and the long-term costs of the possible solutions so that the district can determine which solution will best serve its needs.

4. Consider security measures for protecting both the equipment and the data.

School districts have many responsibilities when building a technology infrastructure, including devising acceptable-use policies and security procedures. Although most schools report positive experiences with technology, it is still important for districts to have rules specifying the consequences of misuses. Deciding how a school district would respond to technology infractions, such as altered or deleted files, disabled or missing workstations, misconfigured networks, and misuses of the Internet, is important to determine in advance.

There are two types of security issues in a technology infrastructure: physical security and electronic security. Physical security measures include installing and/or upgrading the locking systems throughout the school, installing electronic monitoring devices where technology is stored, and electronically tagging all equipment for easy identification if stolen. Electronic security measures include designing a hierarchical access structure for the network; installing firewalls and filters; installing and continually updating monitoring software to search for and report viruses, thefts, and vandals; and installing backup and recovery tools, such as a tape drive that can record and retrieve all networked files and applications.

5. Consider long-term implications.

Technology planning needs to be comprehensive and include consideration of the long-term implications of the choices made. Consider the following points:

- Hardware purchased should be powerful enough to meet future needs, including the need for data, voice, and video capabilities.
- Hardware purchased should meet district needs and have the lowest cost of ownership over the long term. This may lead to networked thin clients and/or networked computers. (See the Glossary.)

- Hardware purchased should have adequate connectivity and network capacity. Demands for bandwidth increase as more connectivity is added to schools and as technologies, such as video streaming that requires high-capacity connectivity, become more available. Districts should consider these increased demands as they plan for the type of connectivity (wireless, hard-wired, or a combination) provided to individual schools and classrooms.

> The Digital California Project *<www.cenic.org/DCP.html>* is a multimillion dollar effort designed to build the necessary network infrastructure needed to prepare California's schools to take advantage of tomorrow's advances in network technology. In essence California is developing an advanced-services network to serve the entire K–20 education and research community.

- The school district should anticipate the obsolescence of technology. The plan should include an equipment replacement schedule that recognizes the useful life of the technology and recycles the old equipment within the district or in the community.

- The plan should result in a student information system that is consistent with local and state data-collection efforts. (Visit the California Student Information System Web site *<www.csis.k12.ca.us>.* The technology plan should promote a system that enables student data to be accessible for analysis by teachers and administrators.

- It is important that school districts plan for adequate technical support for hardware, software, and local and wide area networks. The technology plan should state how teachers obtain technical support, the expected response time, the number of full-time staff needed for technical support, whether students will be involved in providing technical support, and how they will do so. If technical support will be provided in-house, districts are strongly encouraged to establish the maximum number of machines that each technical support person

can maintain and ensure that as the amount of technology expands, the level of technical support is maintained according to the predetermined ratio. For example, if a district with a computer-to-technical support ratio of 50:1 buys 25 new computers, the district will need to identify the budget for another half-time technical support position.

Information needed to make the decisions in this area changes daily. It may be difficult for school districts to keep current with the latest technology. CTAP is available to provide assistance. Some districts find it helpful to do this work in conjunction with an outside consultant. When considering outside consultants, keep in mind that they may favor a particular brand or product; therefore, be sure to ask them to research all possible equipment and infrastructure strategies that would meet the district's needs. It is also recommended that you check consultants' references to ensure that they have the proper expertise and can successfully complete the work you will be hiring them to do.

6. **Include benchmarks and timelines to describe how and when chosen strategies will be implemented.**

   For assistance in generating this component, see Section III, "Suggested Action Steps and Guiding Questions." The suggested action steps identify the tasks that need to be performed to meet the identified infrastructure, hardware, technical support, and software needs. The "Timeline of Suggested Action Steps," in Section IV, may be used to assist the planning team in assigning responsibility and deadlines to complete the tasks. Guiding questions help identify the issues to be considered under each suggested action step.

   To implement the plan, the planning team needs to assign benchmarks and timelines to the proposed strategies. The benchmarks and timelines must be set to provide for the necessary infrastructure, hardware, technical support, and software in time for use by teachers, students, and administrators. A sample management chart and a sample implementation timeline are included in Section IV, "Technology Planning Toolkit."

> Today's electronic learning resources (ELRs) can place a multitude of teaching resources at a teacher's fingertips. ELRs can provide targeted information and/or practice to meet an individual student's need. They can even help the teacher determine where a student is having difficulty and how the difficulty can be mitigated. Some ELRs can even assist the teacher in his or her own development by providing information just in time.

D. Funding and Budget

After an acquisition timeline and a list of needed equipment, infrastructure, and technical support are made, a budget needs to be developed and funding sources identified. Funding is necessary to obtain those items and the training to implement the Curriculum and Professional Development components. The administration and governing board need to understand which expenses are one-time costs and which are ongoing. Recognition of both types of costs is important to garner early commitment for supporting the ongoing costs of maintaining and updating the initial system and the training. Knowledge of which costs are one-time may also be useful in obtaining time and/or resources from private donors who might otherwise be reluctant to make an ongoing financial commitment.

To minimize costs the budget staff should consider hardware and software purchasing agreements in the district and those provided by statewide services, such as the California Statewide Master Agreements for Resources in Technology (C-SMART). The C-Smart Web site is found at *www.c-smart.org*.

Technology, especially the Internet, can bring resources to the classroom to enrich students' learning experiences. For example, at Edison High School (a Year 2 Digital High School) in Fresno, California, the foreign-language teacher uses an Internet browser with audio streaming to bring German radio newscasts, pop music, and talk radio shows to his classroom. The Internet brings his classroom closer to the German culture and real-world language experience.

Just having an education technology plan should increase the resources available. From the outset the district administration and governing board should consider dedicating some ongoing district resources to implement the plan. This act alone will send a powerful message about the importance of the plan and its implementation. Additionally, this plan is structured to meet the planning needs of various state and federal grant programs. The California Department of Education Web site *<www.cde.ca.gov>* should be reviewed regularly to identify the funding for which the school district, or schools within the district, might qualify. Finally, a plan and timeline for the acquisition of specifically identified equipment, hardware, software, and technical support will make it easier to approach the private sector for contributions of discrete pieces of equipment, hardware or software, or the donation of time for technical support.

Finally, although the entire plan needs to be updated regularly, the Funding and Budget component should be kept current so that at any given time the district will know the next piece of equipment that it wants to purchase with the next dollar that comes into the district.

See the suggested action steps and guiding questions for this component in Section III.

Imagine the combined purchasing power of more than 8,000 schools and 1,000 school districts to get better deals on technology purchases. Supported by the California Department of Education, C-SMART is a program that brings cost-effective technology to classrooms. The Web site is at *www.c-smart.org.* C-SMART uses that buying power to negotiate lower purchase prices for hardware, software, and other electronic learning devices. C-SMART works closely with the California Department of General Services and multistate buying powers to provide one-step cost-effective shopping for California school districts.

E. Monitoring and Evaluation

1. Monitor the implementation steps and timelines.

The monitoring of the district's progress in comparison with its original timeline is an important step for managing, updating, and continually improving the plan. Monitoring the implementation of the plan is necessary to evaluate its effect. It is important to know whether all or only some part of the plan has been implemented before determining whether the implementation was effective. Monitoring also allows mid-course corrections if the implementation does not adhere to the schedule. Finally, both the monitoring and the evaluation can help justify the precious expenditures and sacrifices made in the past and help to maintain or even increase funds in the future to support technology expenditures.

2. Evaluate whether the steps taken had the intended effect.

When the district's planning team began the planning process, it focused on the curriculum and the use of technology to help all students master the state content standards and each school meet its Academic Performance Index (API) target. Through the evaluation the district discovers whether its efforts produced results and increased student achievement. To determine whether tech-

nology had a positive impact, possible variables may be considered: student attendance, time-on-task, dropout rate, test scores, student portfolios, or other variables important to the school district and its community. If the intended results did not materialize, the evaluation will assist in determining the next steps that need to be taken to achieve the desired result.

The evaluation may be conducted by an in-house team. An external evaluator, such as someone from an institution of higher education, may also be considered for his or her expertise and perceived impartiality. Remember also that this education technology plan is a part of an overall school improvement plan. Any evaluation of the effect of technology on student achievement should be conducted in collaboration with the overall evaluation of the school improvement effort.

Section III, "Suggested Action Steps and Guiding Questions," which follows, will assist the planning team in generating this component.